

CLAIMS

What is claimed is:

1. An adaptive recording method used with an optical recording medium, according to which a mark is formed using a multiple pulse train comprising a first pulse, a multi-pulse having a peak power level, and a last pulse, and power levels of the first and last pulses are controlled with respect to the peak power level of the multi-pulse depending on a correlation between a mark and a space between successive marks, the method comprising :

setting the power level of the first pulse depending on the correlation between the mark and the space;

setting the power level of the last pulse depending on the correlation between the mark and the space; and

driving a recording unit by the multiple pulse train having the set power levels of the first and last pulses.

2. The method of claim 1, wherein the power level of the last pulse is set independent of the power level of the first pulse.

3. The method of claim 1, further comprising changing the power level of the multi-pulse depending on the energy of a non-return-to-zero inverted (NRZI) signal.

4. The method of claim 1, wherein the recording unit is a laser diode.

5. The method of claim 1, wherein the power level of the first pulse is set higher or lower than the reference power level.

6. The method of claim 1, the power level of the first pulse is set depending on a correlation between a current mark and a previous space.

7. The method of claim 6, the power level of the first pulse is set depending on the correlation between the current mark and the previous space or the size of the current mark.

8. The method of claim 1, the power level of the first pulse is set depending on the size of a current mark.

TOKUYAMA

9. The method of claim 1, the power level of the last pulse is set higher or lower than the reference power level.
10. The method of claim 1, the power level of the last pulse is set depending on the correlation between the current mark and a next space.
11. The method of claim 9, wherein the power level of the last pulse is set depending on the correlation between the current mark and the next space or the size of the current mark.
12. The method of claim 1 the power level of the last pulse is set depending on the size of the current mark.
13. An adaptive recording apparatus having a laser diode and used with an optical recording medium, which forms a mark using a multiple pulse train comprising a first pulse, a multi-pulse having a peak power level P_w , and a last pulse, and controls the power levels of the first and last pulses with respect to the peak power level of the multi-pulse depending on a correlation between a mark and a space between successive marks, the apparatus comprising:
 - a non-return-to-zero inverted (NRZI) detector that receives an NRZI signal to detect correlation between a current mark and each of previous and next spaces;
 - a pulse generator that generates power control signals including a read control signal, a peak control signal, and a bias control signal generating the multiple pulse train referring to the correlation detected by the NRZI detector and select control signals generated during intervals of the first and last pulses;
 - an operational unit that feeds back an output of the laser diode, determines a peak power level P_{wh} , and generates a power level P_{wl} , which is higher than the peak power level P_w , and a power level P_{wl} , which is lower than the peak power level P_w ; and
 - a multiplexer selectively outputting one of the power levels P_{wh} , P_w , and P_{wl} output from the operational unit during the first or last pulse intervals in response to the select control signals.
14. The apparatus according to claim 13, wherein the operational unit generates the power levels P_{wh} and P_{wl} by adding or subtracting a predetermined value to or from the peak power level P_w , respectively.

TOKUYAMA CORP.

15. The apparatus according to claim 13, wherein a first one of the select control signals indicates whether the power level P_{wh} output from said operational unit is selected, a second select control signal indicates whether the power level P_w output from said operational unit is selected, and a third one of the select control signal indicates whether the power level P_{wl} output from said operational unit is selected.

16. The apparatus according to claim 15, wherein the first and third select control signals have priority over said second select control signal.

17. An adaptive recording apparatus having a laser diode recording on an optical recording medium, which forms a mark using a multi-pulse train comprising a first pulse, a multi-pulse having an optimum peak power level P_w , and a last pulse, and controls the power levels of the first and last pulses with respect to the peak power level of the multi-pulse depending on a correlation between a mark and a space between successive marks, the apparatus comprising:

a pulse generator generating power control signals including a read control signal, a peak control signal, and a bias control signal that generate the multi-pulse train referring to a non-return-to-zero inverted NRZI signal detecting a correlation between a current mark and each of previous next spaces and select control signals generated during intervals of the first and last pulses; and

a laser diode driver feeding back an output of the laser diode, determining the optimum peak power level P_w , a power level P_{wh} higher than P_w , and a power level P_{wl} lower than P_w , and selectively outputting one of P_{wh} , P_w and P_{wl} during the first or last pulse intervals in response to the select control signals.

18. A method of controlling recording a signal on an optical disc using multiple pulse trains comprising a first multi-pulse train having a first pulse, a multi-pulse having a reference power level, and a last pulse, the method comprising:

controlling the power level of said last pulse independent of the power level of said first pulse.

19. The method according to claim 18, wherein the power levels of the first and last pulse are controlled by selecting a peak power level P_w , a power P_{wh} higher than the peak

power level P_{w_0} , or power P_{wl} lower than the peak power level P_w to be generated during the first and last pulses.

20. The method according to claim 19, wherein P_w is an optimum peak power level and P_w and P_{wl} are generated by adding or subtracting a predetermined value to or from the optimum peak power level P_w , respectively.

21. The method according to claim 18, wherein said multi-pulse reference power level is greater than said first pulse power level and less than said last pulse power level.

22. The method according to claim 19, wherein said multiple pulse trains further comprises a second multi-pulse train having a first pulse, a multi-pulse having a reference power level, and a last pulse, wherein the power level of said multi-pulse of said second multi-pulse train is less than said first pulse power level of said second multi-pulse train and greater than said last pulse power level of said second multi-pulse train.

23. The method according to claim 22, wherein said multiple pulse trains further comprise a third multi-pulse train having a first pulse, a multi-pulse having a reference power level, and a last pulse, wherein the power level of said multi-pulse of the third multi-pulse train is equal to said first pulse power level of said third multi-pulse train and great than said last pulse power level of said third multi-pulse train.

24. A method of controlling recording marks on an optical disc using multiple pulse trains comprising first, second and third multi-pulse trains each having a first pulse, a multi-pulse having a reference power level, and a last pulse, the method comprising:

providing a different reference power level to each multi-pulse train depending on the energy or density of a non-return-to-zero inverted (NRZI) signal detecting correlation between a current mark and a space between successive marks.

25. The method according to claim 24, wherein the power level of the first and last pulse of each of said first, second and third multi-pulse trains is higher or lower than said reference power level.

26. The method according to claim 18, wherein the power level of said multi-pulse is controlled independent of said first and last pulses.

PRINTED IN U.S.A. 1990